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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/830,216	04/23/2004	Parthasarathy Ranganathan	200400352-1	9361

22879 7590 11/21/2007
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EXAMINER	
LESPERANCE, JEAN E	

ART UNIT	PAPER NUMBER
2629	

MAIL DATE	DELIVERY MODE
11/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/830,216	RANGANATHAN ET AL.
	Examiner	Art Unit
	Jean E. Lesperance	2629

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *April 23, 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed September 10, 2007 is presented for examination and claims 1-35 are pending.

Response to Arguments

2. Applicant's arguments filed September 10, 2007 have been fully considered but they are not persuasive. The applicant's representative argued that the prior art does not teach comparing the lifetime metric to a threshold and determining to perform the step of identifying a plurality of display control options in response to the lifetime metric exceeding the threshold. Examiner disagrees with the applicant because the prior art teaches to determine an end of life based on JND's, one can say that the display becomes non-acceptable for commercial use when color differences are more than a certain number of JND's, e.g. 3 JND's. Thus, one end point of the useful life of a pixel can be related to when one or more of its sub-pixel elements has changed its output such that the light output of the complete pixel structure <u>compared</u> to the specified output differs by an amount which lies outside a relevant tolerance (column 9, lines 38-46); and If the three sub-pixel emitter areas so determined <u>exceed</u> the available area for the pixel in the display design (depending on the fill factor and pitch), then areas have to be reduced while maintaining relative proportions. If the total area is less than the available area a third optimization is possible. The brightness can be increased by increasing the area (while maintaining the relative proportions of each color) while maintaining current densities the same or the target brightness can be kept and the

current densities reduced by increasing the areas (while maintaining the relative proportions of each color) until the fill factor is a maximum (column 9, line 66 to column 10, line 9). The applicant's representative argued that the prior art does not teach determining properties of screen usage for the display, the display displaying information from the applications and estimating the use of the at least a portion of the display based on the estimated lifetime costs and determined properties. Examiner disagrees with the applicant because the prior art teaches Fig.11. Therefore, the rejection is maintained.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-35 are rejected under 35 U.S.C. 102(e) as being unpatentable over USPN 7,176,861 by Dedene et al.

Regarding claim 1, Dedene et al. teach a method of optimizing lifetime of a display (A display having sub-pixel elements optimized so that each pixel element displays white at a predetermined white point within a certain tolerance over a lifetime of the pixel (abstract)), the method comprising:

determining whether to control at least a portion of a display based on a lifetime

metric (The purpose of these methods is to determine sub-pixel areas such that each sub-pixel has a lifetime similar to that of the complete pixel itself (column 12, lines 32-36));

identifying a plurality of display control options in response to determining to control the at least a portion of the display (calculate the brightness of each sub-pixel Fig.8 (106)); and

selecting at least one of the display control options to control the display (If NO in step 111, then other sub-pixel areas are selected in step 107, e.g. smaller or larger areas depending on whether the final pixel brightness is above or below tolerance (column 13, lines 59-62)).

to determine an end of life based on JND's, one can say that the display becomes non-acceptable for commercial use when color differences are more than a certain number of JND's, e.g. 3 JND's. Thus, one end point of the useful life of a pixel can be related to when one or more of its sub-pixel elements has changed its output such that the light output of the complete pixel structure compared to the specified output differs by an amount which lies outside a relevant tolerance (column 9, lines 38-46); and If the three sub-pixel emitter areas so determined exceed the available area for the pixel in the display design (depending on the fill factor and pitch), then areas have to be reduced while maintaining relative proportions. If the total area is less than the available area a third optimization is possible. The brightness can be increased by increasing the area (while maintaining the relative proportions of each color) while maintaining current densities the same or the target brightness can be kept and the

current densities reduced by increasing the areas (while maintaining the relative proportions of each color) until the fill factor is a maximum (column 9, line 66 to column 10, line 9).

Regarding claim 2, Dedene et al. teach implementing the selected display control option to increase a remaining life of the at least a portion of the display (Clearly there is a need to design a solution for solving at least one of and preferably both of two problems: a) Maximizing light output or reducing the size of each pixel for a given output which are equivalent to each other, b) Maximizing the lifetime of a pixel. A pixel is no longer useful when one of its sub-pixel emitters is outside specified guaranteed values. If one sub-pixel provides less than the required output then there is a color shift for each color displayed (column 8, lines 29-38)).

Regarding claim 3, Dedene et al. teach identifying a plurality of display control options using a usage model (index time period and calculate the aging sub-pixels Fig.8 (108)).

Regarding claim 4, Dedene et al. teach selecting at least one of the display control options using at least one of the usage model and a lifetime model (when executed may calculate a temperature of each sub-pixel element when each pixel element displays white at the predetermined white point, and may calculate an aging effect on each sub-pixel element based on the calculated temperature. When the display is powered by a battery, the display element to be optimized may be the battery, and the code, when executed, may optimize the sub-pixel areas to optimize the battery lifetime between charging over the lifetime of the pixel elements (column 18, lines 41-

50)).

Regarding claim 5, Dedene et al. teach comparing the lifetime metric to a threshold Fig.8 (109); and

determining to perform the step of identifying a plurality of display control options in response to the lifetime metric exceeding the threshold (If the three sub-pixel emitter areas so determined exceed the available area for the pixel in the display design (depending on the fill factor and pitch), then areas have to be reduced while maintaining relative proportions. If the total area is less than the available area a third optimization is possible (column 9, line 66 to column 10, line 3)).

Regarding claim 6, Dedene et al. teach evaluating the plurality of display control options Fig.10 (106); and

selecting the at least one of the plurality of display options based on the evaluation Fig.10 (107).

Regarding claim 7, Dedene et al. teach identifying a constraint on implementing any one of the plurality of display control options Fig.10 (109).

Regarding claim 8, Dedene et al. teach the constraint comprises a user acceptance setting Fig.10 (110).

Regarding claim 9, Dedene et al. teach determining a lifetime savings for each of the plurality of the display control options Fig.8 (108).

Regarding claim 10, Dedene et al. teach evaluating lifetime metrics and non-lifetime metrics for each of the plurality of display control options Fig.10 (106); and ranking the plurality of display control options based on the evaluation Fig.10 (107).

Regarding claim 11, Dedene et al. teach using at least one of a lifetime model and a usage model to evaluate lifetime metrics and non-lifetime metrics for each of the plurality of display control options (when executed may calculate a temperature of each sub-pixel element when each pixel element displays white at the predetermined white point, and may calculate an aging effect on each sub-pixel element based on the calculated temperature. When the display is powered by a battery, the display element to be optimized may be the battery, and the code, when executed, may optimize the sub-pixel areas to optimize the battery lifetime between charging over the lifetime of the pixel elements (column 18, lines 41-50)).

Regarding claim 12, Dedene et al. teach determining at least one of past use and predicted future use of the at least a portion of the display Fig.10 (108).

Regarding claim 13, Dedene et al. teach using a lifetime model to determine the lifetime metric (A physical model of the display as a mesh of nodes is input into a computer and information defining heat sources and sinks, as well as thermal conductivities, reflectivities and convective properties of materials. This physical model is then solved using numerical analysis or any other suitable analytic method to determine the temperature of each pixel element (column 12, lines 7-13)), wherein the lifetime model includes an estimation of the lifetime of the at least a portion of the display Fig.10 (108).

Regarding claim 14, Dedene et al. teach the lifetime model comprises a display degradation curve or another similar estimation of remaining lifetime of the display based on past use of the display (Whereas in the above methods the driving current for

each pixel element as well as the temperature of the display is assumed to remain substantially constant over the lifetime of the display, in this algorithm the current is allowed to change during the lifetime of the display which will also effect the temperature of the display (see Figure 11)).

Regarding claim 15, Dedene et al. teach measuring use of the at least a portion of the display and applying the measured use to the lifetime model to determine the lifetime metric (Exponent n is an integer chosen such that the I V characteristic is matched sufficiently well with measured values. If desired, one can however choose to use actual measured values themselves independent of a simplifying formula, e.g. more accurate measured data over a range of current densities and voltages (Figure 6)).

Regarding claim 16, Dedene et al. teach estimating the lifetime costs of applications typically executed on a computer system including the display (The total consumed energy provides a value for an aspect of the operating costs, that is electrical power used. Alternatively, the value of the currents returned in step 307 provide information as to the instantaneous heat emitted by the device. It may be desired to limit this amount of heat (column 14, lines 28-6));

determining properties of screen usage for the display, the display displaying information from the applications Fig.11 (305);

estimating the use of the at least a portion of the display based on the estimated lifetime costs and determined properties Fig.11 (303); and

applying the estimated use to the lifetime model to determine the lifetime metric Fig.11 (304).

Regarding claim 17, Dedene et al. teach analyzing usage of at least one of the display and one or more displays similar to the display Fig.8 (106); determining usage patterns from analyzing the usage and analyzing the usage patterns to determine the plurality of display control optionsFig.8 (108).

Regarding claim 18, Dedene et al. teach the at least a portion of the display comprises at least one of a sub-pixel, a pixel, and a group of pixels in the display (see Figure 4 (2)).

Regarding claim 19, Dedene et al. teach the plurality of display control options comprise parameters for displaying information on the at least a portion of the display Fig.15 (67).

Regarding claim 20, Dedene et al. teach determining a lifetime metric for at least a portion of a display using a lifetime model (A physical <u>model of the display</u> as a mesh of nodes is input into a computer and information defining heat sources and sinks, as well as thermal conductivities, reflectivities and convective properties of materials. This physical <u>model</u> is then solved using numerical analysis or any other suitable analytic method to <u>determine</u> the temperature of each pixel element (column 12, lines 7-13));

determining whether to control the at least a portion of the display based on the lifetime metric (The purpose of these methods is to <u>determine</u> sub-pixel areas such that each sub-pixel has a <u>lifetime</u> similar to that of the complete pixel itself (column 12, lines 32-36)); and

identifying at least one display control option using a usage model in response to determining to control the at least a portion of the display (calculate the brightness of

each sub-pixel Fig.8 (106)).

Regarding claim 21, Dedene et al. teach implementing the selected display control option to increase a remaining life of the at least a portion of the display (Clearly there is a need to design a solution for solving at least one of and preferably both of two problems: a) Maximizing light output or reducing the size of each pixel for a given output which are equivalent to each other, b) Maximizing the lifetime of a pixel. A pixel is no longer useful when one of its sub-pixel emitters is outside specified guaranteed values. If one sub-pixel provides less than the required output then there is a color shift for each color displayed (column 8, lines 29-38)).

Regarding claim 22, Dedene et al. teach the lifetime model includes an estimation of the lifetime of the at least a portion of the display (index time period and calculate the aging sub-pixels Fig.8 (108)).

Regarding claim 23, Dedene et al. teach profiling use of at least one of the display and one or more displays similar to the display to establish the usage model Fig.11 (305).

Regarding claim 24, Dedene et al. teach profiling use by a current user of the display Fig.11 (305).

Regarding claim 25, Dedene et al. teach analyzing past use of at least one of the display and the one or more similar displays by a plurality of users Fig.11 (305).

Regarding claim 26, Dedene et al. teach means for displaying information (video display terminal Fig.15 (44));

means for determining a lifetime metric associated with at least a portion of the

means for displaying Fig.8 (108));

means for determining whether to control the at least a portion of the means for displaying based on the lifetime metric (The purpose of these methods is to determine sub-pixel areas such that each sub-pixel has a lifetime similar to that of the complete pixel itself (column 12, lines 32-36)); and

means for identifying a plurality of display control options operable to increase a remaining life of at least a portion of the display in response to determining to control the at least a portion of the means for displaying (calculate the brightness of each sub-pixel Fig.8 (106)).

Regarding claim 27, Dedene et al. teach lifetime model means for estimating a life of the means for displaying Fig.11 (305).

Regarding claim 28, Dedene et al. teach usage model means for estimating usage of the means for displaying Fig.11 (305).

Regarding claim 29, Dedene et al. teach means for evaluating the plurality of display control options using at least one of the lifetime model means and the usage model means Fig.10 (106); and

means for selecting at least one of the plurality of display control options based on the evaluation Fig.10 (107).

Regarding claim 30, Dedene et al. teach means for implementing a selected one of the plurality of display control options Fig.10 (107).

Regarding claim 31, Dedene et al. teach Computer software embedded on a computer readable medium (a computer program product comprising software, the

software having code for <u>selecting</u> areas of at least two sub-pixel elements of a <u>display</u> and modifying the areas of the at least two sub-pixel elements to <u>optimize</u> a lifetime of one or more elements of the <u>display</u> when the code is executed on a computing device (column 18, lines 4-10)), the computer software comprising instructions of:

determining whether to control at least a portion of a display based on a lifetime metric (The purpose of these methods is to <u>determine</u> sub-pixel areas such that each sub-pixel has a <u>lifetime</u> similar to that of the complete pixel itself (column 12, lines 32-36));

identifying a plurality of display control options in response to determining to control the at least a portion of the display (calculate the brightness of each sub-pixel Fig.8 (106)); and

selecting at least one of the display control options to control the display(If NO in step 111, then other sub-pixel areas are <u>selected</u> in step 107, e.g. smaller or larger areas depending on whether the final pixel brightness is above or below tolerance (column 13, lines 59-62)).

Regarding claim 32, Dedene et al. teach implementing the selected display control option to increase a remaining life of the at least a portion of the display (Clearly there is a need to design a solution for solving at least one of and preferably both of two problems: a) <u>Maximizing</u> light output or reducing the size of each pixel for a given output which are equivalent to each other, b) <u>Maximizing the lifetime</u> of a pixel. A pixel is no longer useful when one of its sub-pixel emitters is outside specified guaranteed values. If one sub-pixel provides less than the required output then there is a color shift for each

color displayed (column 8, lines 29-38)).

Regarding claim 33, Dedene et al. teach identifying a plurality of display control options using a usage model (index time period and calculate the aging sub-pixels Fig.8 (108)).

Regarding claim 34, Dedene et al. teach selecting at least one of the display control options using at least one of the usage model and a lifetime model (when executed may calculate a temperature of each sub-pixel element when each pixel element displays white at the predetermined white point, and may calculate an aging effect on each sub-pixel element based on the calculated temperature. When the display is powered by a battery, the display element to be optimized may be the battery, and the code, when executed, may optimize the sub-pixel areas to optimize the battery lifetime between charging over the lifetime of the pixel elements (column 18, lines 41-50)).

Regarding claim 35, Dedene et al. teach a display operable to display a visual representation of information on the display (video display terminal Fig.15 (44));

a processor operable to determine a plurality of control options for increasing the remaining life of the display, each control option including parameters varying the visual representation of information on the display (parameter control unit Fig.15 (67)); and

a display controller operable to receive parameters for one of the control options identified by the processor to control the visual representation of information on the display (a computer program product comprising software, the software having code for selecting areas of at least two sub-pixel elements of a display and modifying the areas

of the at least two sub-pixel elements to optimize a lifetime of one or more elements of the display when the code is executed on a computing device (column 18, lines 4-10)).

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the ably examiner should be directed to Jean Lesperance whose telephone number is (571) 272-7692. The examiner can normally be reached on from Monday to Friday between 10:OOAM and 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on (571) 272-7691.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(571) 273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Jean Lesperance
Jean Lesperance
Art Unit 2629

Date 11/14/2007

RICHARD HJERPE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600